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REMARKS

In the Office Action mailed December 7, 2005, the examiner insists that claim 1 of the present invention is obvious from U.S. Patent Publication Application No. 2003/0025868 (Hiroshima) in view of U.S. Patent No. 5,659,379 (Morimoto) and U.S. Patent No. 6,281,952 (Okamoto).

As the examiner states, Hiroshima discloses a liquid crystal display comprising a columnar spacer disposed on a common electrode (IT02) in a display area, and columnar spacers disposed inside and outside of a seal (SL) provided around the periphery of the display area (refer FIG. 1). By providing such columnar spacers (SP2 and SP3) inside and outside of the seal (SL), Hiroshima intends to prevent too much pressure from being applied to the columnar spacer on the common electrode (SP1) and the seal (SL) when the liquid crystal compound is filled into the liquid crystal display.

Hiroshima states that "to compare three types of columnar spacers with respect to the clearance between the main surface of the substrate on which the pixel electrodes are formed and the upper surface of the columnar spacer which faces the main surface in opposed manner, the clearance on the common electrode is the smallest" in [0025] of the specification. However, the columnar spacer (SP1) is formed on the common electrode, and also, the orientation films and thin film transistors are provided in between the top surface of the columnar spacer (SP1) and the counter substrate (SUB1). Therefore, "the clearance on the common electrode is the smallest" does not necessarily mean that "the height

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from the substrate (SUB2) surface to the top surface of the columnar spacer (SP1) is the highest", as in the present invention.

Moreover, in FIG. 1 of Hiroshima, the height from the substrate (SUB2) surface to the top surface of the columnar spacer (SP1) is drawn to be higher than the height from the substrate (SUB2) surface to the top surface of the columnar spacer (SP2) inside the seal or the columnar spacer (SP3) outside the seal. However, a drawing attached to a specification usually shows frame format of an invention, that is, dimension (measurement) of the configuration shown in such figure is not true to its actual dimension. Therefore, even if it is shown in a schematic drawing, Hiroshima does not actually disclose that "the height from the substrate (SUB2) surface to the top surface of the columnar spacer (SP1) is the highest".

Further, in claim 2, Hiroshima states that "the columnar spacers provided in the vicinity of the sealing material are higher in a direction toward the substrate than those in the display area", and the columnar spacers (SP2 and SP3) are formed to be in contact with the counter substrate in FIG. 2. Claim 2 and FIG. 2 are disclosed as a preferable embodiment in order to achieve the object of Hiroshima. Thus, Hiroshima suggests an opposite situation to the present invention, which discloses that the height from the substrate surface to the top surface of the columnar spacer provided in the pixel area is higher than that of the outer peripheral part. For these reasons, Hiroshima cannot be a reference cited to deny inventive step of the present invention.

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In addition, Hiroshima forms the columnar spacer (SP1) on the overcoat layer provided on the color filter. However, in the substrate for a monochrome liquid crystal display used in the present invention, the color filter as in Hiroshima is not provided, and the black matrix formed in the pixel part is narrower in its width than that of the outer peripheral part. Therefore, in the pixel part, the protection layer is hardly laminated on such black matrix so that the film thickness of the protection layer in the pixel part will be thinner than that of the outer peripheral part. In the present invention, higher columnar spacer, than that in the outer peripheral part, is used in the pixel part having thinner thickness in order to solve a problem, which is peculiar to monochrome liquid crystal displays. On the other hand, in FIG. 1, Hiroshima uses commonly used columnar spacers of the same height in the pixel part having a large thickness due to the color filter formed in the region. As a result, the height of the top surface the columnar spacer (SP1) is higher than that of the columnar spacers (SP2 and SP3), that is, this configuration is accidentally obtained. On the contrary, in the present invention, this configuration is obtained on purpose by using higher columnar spacer in the outer peripheral part.

Therefore, the present invention is not obvious by combining the disclosure of Hiroshima and Morimoto, which merely discloses a thickness of a counter electrode, and Okamoto which merely discloses that either of the transmission display and reflection display can be monochrome display.

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In addition to the above, the Examiner insists that claim 1 and 4 of the present invention is obvious from U.S. Patent No. 6,819,391 (Kim) in view of Morimoto.

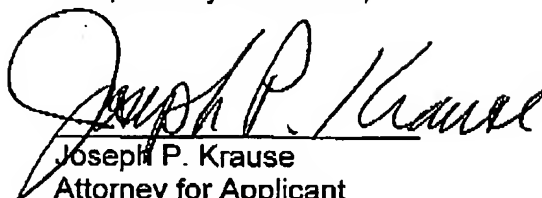
The present invention solves a problem, which is peculiar to monochrome liquid crystal display, that if the columnar spacers of the same height are used in all areas of the substrate, the counter substrate disposed on the columnar spacer is deformed so that light leakage occurs at the periphery of the counter substrate. Such problem is caused by the thickness difference of the protection layer deriving from the width difference of the black matrix. Therefore, such problem does not occur in a color liquid crystal display in which coloring layer is formed in the pixel part. The invention of Kim is related to the columnar spacer in a color liquid crystal display, in which the above-mentioned problem will not occur, so that it is not related to the problem that the present invention resolves.

Moreover, Kim states that the columnar spacer formed in the pixel region and the columnar spacer formed in the dummy region are same in height (col. 5, lines 10 to 13). As mentioned above, the present invention intends to solve a problem deriving from the usage of the columnar spacer of the same height, as Kim discloses, in a monochrome liquid crystal display. Therefore, even if the invention of Kim is applied to the present invention, the above-mentioned problem, which the present invention solves cannot be solved. For these reasons, the present invention is not obvious by combining such invention of Kim and the above-mentioned invention of Okamoto.

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Respectfully submitted,

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